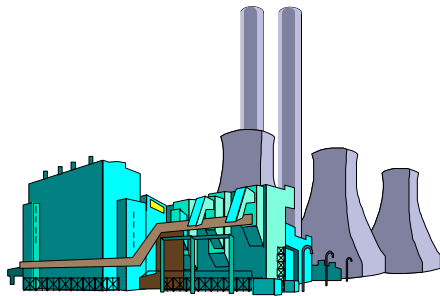# PRIER – A Tool for Planning Multi-Pollutant Control Strategies

Existing Coal Plants

Richard Booth (URS)
George Warriner (URS)
Leo Makovsky (NETL)
Gordon Page (Consultant)

NETL

PRIER = **P**ower **R**eliability **I**mprovement & **E**mission **R**eduction
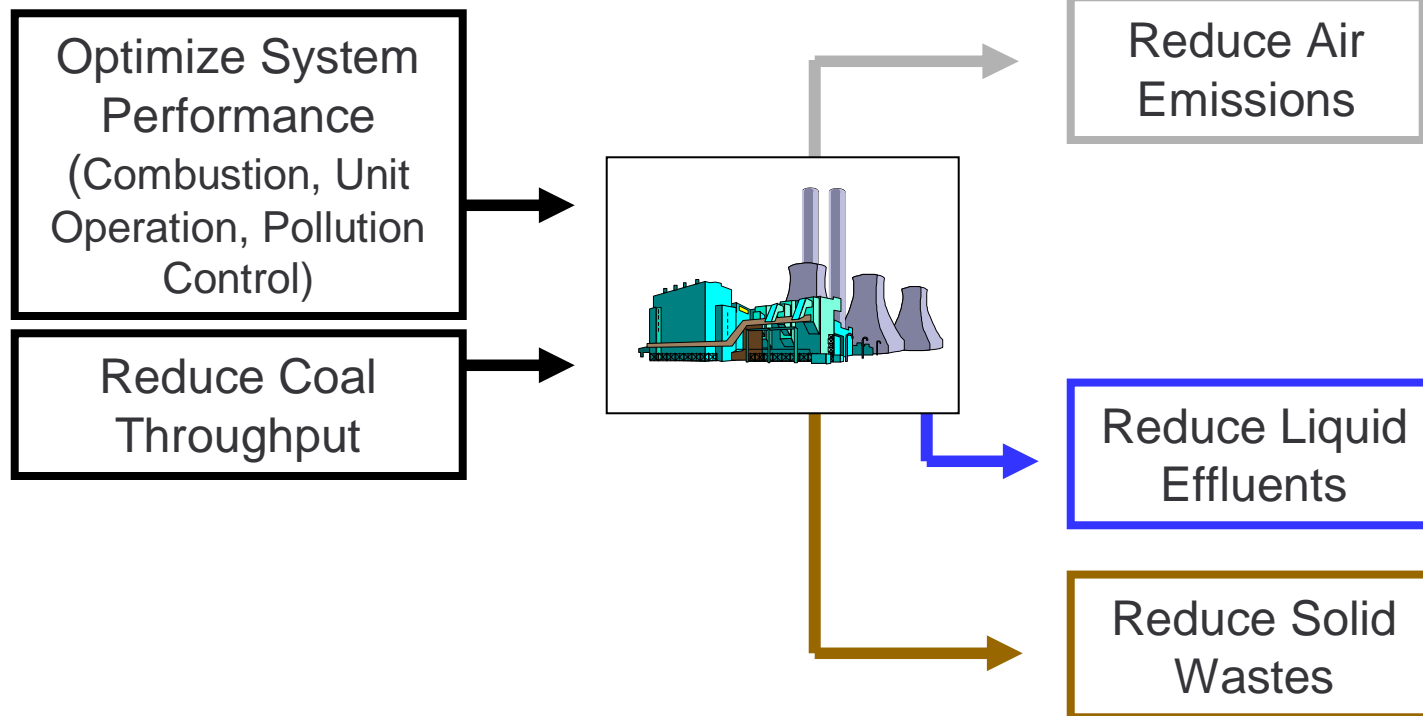
PRIER Program Goal

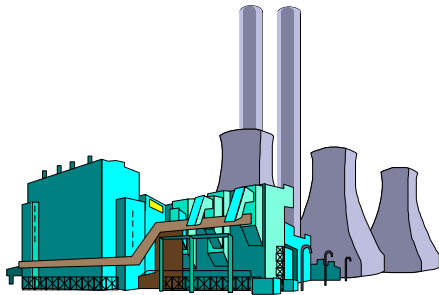Identify and Verify Technologies and Systems that Reduce Multi-Pollutant Emissions by Improving Plant Performance

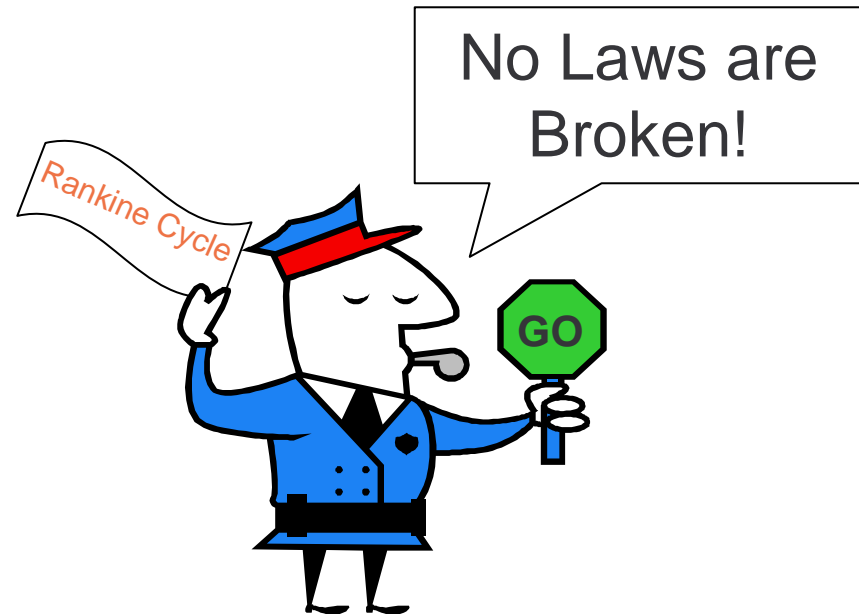# PRIER Technologies & Systems

Performance Improvement   **Results**

Optimize System Performance (Combustion, Unit Operation, Pollution Control)

Reduce Coal Throughput

Reduce Air Emissions

Reduce Liquid Effluents

Reduce Solid Wastes

PRIER Improvements are Real

Includes the Total Plant

Thermodynamic Police

PRIER Program Approach

- **Initial Data Collection Visits** – estimate potential range for plant performance improvement

- **Detailed PRIER Analysis** – validate initial visit estimates

- **Field Studies** – validate new PRIER technologies

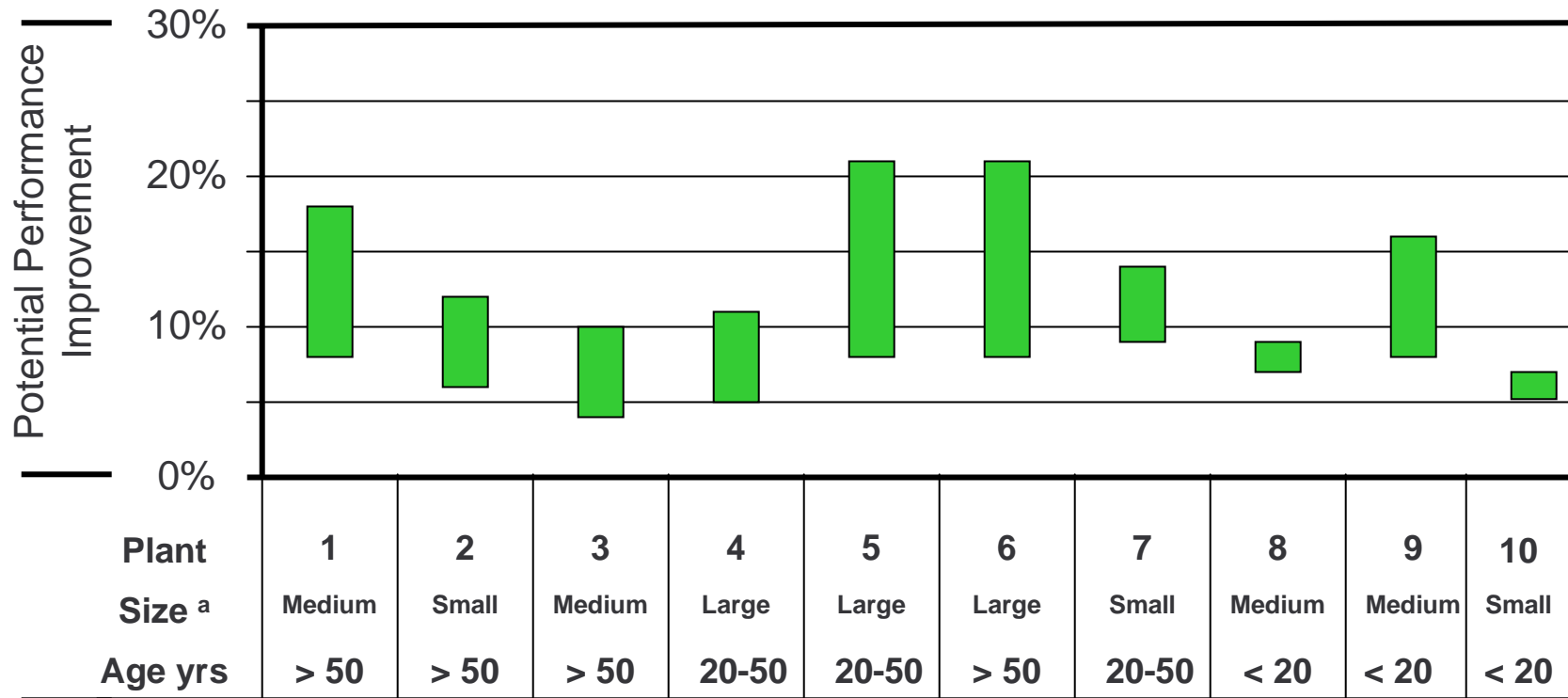- **Compendia** – capture, store, and disseminate knowledge

PRIER Program Results

- Potential Performance Improvements
- Example PRIER Technologies and Systems
- Field Study Status
- Compendia Status

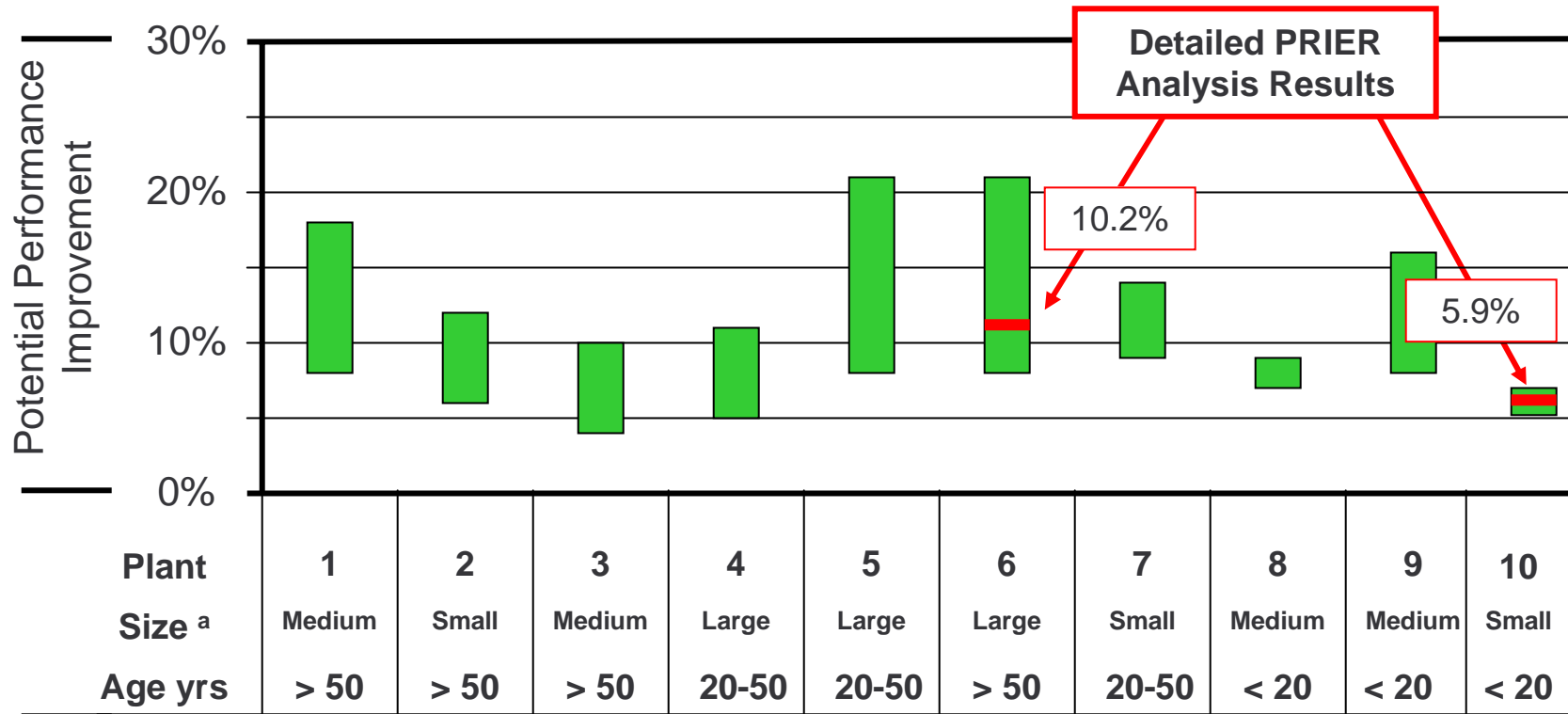# Initial Data Collection Visits

Potential Range of Coal Plant Performance Improvement

a Size: Small = < 500 MW; Medium = 500 to 1000 MW; Large = > 1000 MW

Detailed PRIER Analysis

Potential Range of Coal Plant Performance Improvement

Example PRIER Technologies & Systems

PRIER Technology or System	Performance Improvement	Emissions Reduction
DCS Tuning	0.5 – 2 %	0.5 – 2%
Next Gen. Intel. Soot Blow	1 – 2 %	1 – 2 % **plus**
Combustion Optimization	0.1 – 0.5 %	0.1 – 0.5 % **plus**
Global Unit Optimization	0.1 – 0.5 %	0.1 – 0.5 % **plus**
Load Dispatch Optimization	1 – 5 %	1 – 5 %
Turbine Upgrade	5 – 7 %	5 – 7 %
Condenser Maintenance	1 – 2 %	1 – 2 %
Reduce Intake Water Temp	1 – 2 %	1 – 2 %

plus – additional specific pollutant reductions from system optimization (e.g., combustion system NO_x)

Field Studies

- **Field Study No. 1**
  - Next Generation Intelligent Sootblowing (NGISB)
  - Started in August 2003
  - New plant with variable coal feeds
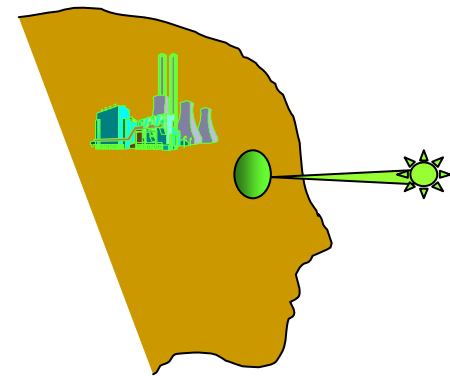- **Additional Field Studies in 2003 and 2004**

Compendia – Ultimate Success of the PRIER Program

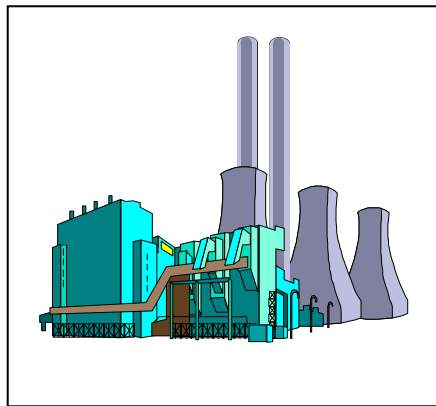Capture, validate, store, disseminate knowledge

Easy to use

Cost effective

Field study knowledge provides the basis of design

Conclusions

Reduce Multi-pollutant Emissions by 6 to 13 %

Air emissions
Liquid effluents
Solid wastes

Reduce Greenhouse Gases by 6 to 13 %

Reduce Resource Usage (e.g., Water)

Reduce Operating Costs

Improve Plant Reliability

Conclusions

Reduced Emissions:

Coal Mining
Coal Preparation
Coal Transportation

⇒

Reduce Multi-pollutant Emissions

Air emissions
Liquid effluents
Solid wastes

Reduced Emissions:

Solid Waste (ash, scrubber sludge)
Transport and Disposal

⇒

Reduce Greenhouse Gases

Reduce Resource Usage (e.g., Water)

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